

WHAT IS CLAIMED IS:

1. A photoelectric converter having a photoelectric converting section on an insulating substrate, the photoelectric converting section
5 comprising:

a first electrode layer;

an insulating layer for inhibiting both types of carriers, a first type of carriers and a second type of carriers having positive or negative characteristics
10 opposite to those of the first type of carriers, from passing through the layer;

a photoelectric converting semiconductor layer;

an injection blocking layer for inhibiting the first type of carriers from being injected to the
15 semiconductor layer; and

a second electrode layer.

2. A photoelectric converter according to claim 1, further comprising:

20 a power-supply section for applying an electric field to each layer of said photoelectric converting section in a direction so that said first type of carriers are introduced from said semiconductor layer to said second electrode layer in a refresh mode or in
25 a direction so that said first type of carriers generated by light incident on said semiconductor layer are remained in said semiconductor layer and said

second type of carriers are introduced to said second electrode layer in a photoelectric conversion mode; and

5 a detecting section for detecting said first type of carriers stored in said semiconductor layer or said second type of carriers introduced to said second electrode layer in the photoelectric conversion mode.

3. A photoelectric converter according to claim 1, wherein at least one of said first and second
10 electrodes has a transparent layer.

4. A photoelectric converter according to claim 1, wherein said semiconductor layer contains
15 hydrogenated amorphous-silicon.

5. A photoelectric converter according to claim 1, wherein said injection blocking layer is a
semiconductor formed by doping an n-type or p-type
chemical element therein.

20 6. A photoelectric converter according to claim 1, wherein said injection blocking layer is a barrier layer generated by a difference in work function between said second electrode layer and said
25 semiconductor layer.

7. A photoelectric converter according to claim

1, further comprising a switching element on the substrate.

8. A photoelectric converter according to claim
5 7, wherein said switching element is a capacitor having
a gate electrode, a second insulating layer, a second
semiconductor layer and first and second main electrode
layers, the first and second main electrode layers
being provided in said second semiconductor layer so as
10 to be spaced through an ohmic contact layer.

9. A photoelectric converter according to claim
8, wherein said gate electrode, said second insulating
layer, said second semiconductor layer, said ohmic
15 contact layer and said first and second main electrode
layers of said switching element are respectively
common-layers with said first electrode layer, said
insulating layer, said semiconductor layer, said
injection blocking layer and said second electrode
20 layer of said photoelectric converting section.

10. A photoelectric converter according to claim
8, wherein said second semiconductor layer contains
hydrogenated amorphous-silicon.

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11. A photoelectric converter according to claim
7, further comprising a capacitive element.

12. A photoelectric converter according to claim
11, wherein said capacitive element has a third
electrode layer, a fourth electrode layer and a third
insulating layer provided between the third and fourth
5 electrode layers.

13. A photoelectric converter according to claim
8, further comprising a capacitive element having a
third electrode layer, a fourth electrode layer and a
10 third insulating layer provided between the third and
fourth electrode layers.

14. A photoelectric converter according to claim
11, wherein said capacitive element stores electric
15 signals based on optical information photoelectrically
converted in said photoelectric converting section.

15. A photoelectric converter according to claim
11, wherein said third electrode layer, said third
20 insulating layer and said fourth electrode layer of
said capacitive element are respectively common-layers
with said first electrode layer, said insulating layer
and said second electrode layer of said photoelectric
converting section.

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16. A photoelectric converter according to claim
13, wherein said third electrode layer, said third

insulating layer and said fourth electrode layer of
said capacitive element are respectively common-layers
with said first electrode layer, said insulating layer
and said second electrode layer of said photoelectric
5 converting section.

17. A photoelectric converter according to claim
1, further comprising a plurality of said photoelectric
converting sections.

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18. A photoelectric converter according to claim
17, wherein said photoelectric converting sections are
arranged one-dimensionally or two-dimensionally.

15 19. A photoelectric converter according to claim
17, wherein said photoelectric converting sections
respectively have switching elements.

20 20. A photoelectric converter according to claim
19, wherein said photoelectric converting sections are
connected commonly in desired numbers and divided into
a plurality of blocks so that said switching element is
operable every block.

25 21. A photoelectric converter according to claim
20, further comprising a matrix signal line for
outputting signals from a plurality of photoelectric

converting elements divided into said plurality of blocks.

22. A photoelectric converter according to claim
5 21, wherein said matrix signal line has a fifth
electrode layer, a sixth electrode layer and a middle
layer at an intersection of two lines of said matrix
signal line, the middle layer being provided between
said fifth electrode layer and said sixth electrode
10 layer.

23. A photoelectric converter according to claim
22, wherein said middle layer has a fourth insulating
layer.
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24. A photoelectric converter according to claim
22, wherein said middle layer has a fourth insulating
layer and said fifth electrode layer, said fourth
insulating layer and said sixth electrode layer are
20 respectively common-layers with said first electrode
layer, said insulating layer and said second electrode
layer of said photoelectric converting section.

25. A photoelectric converter according to claim
25 1, further comprising a refresh means for applying a
pulse voltage through a pulse-applying capacitive
element to apply an electric field to said

photoelectric converting section.

26. A photoelectric converter according to claim
25, wherein the layer structure of said pulse-applying
5 capacitive element is the same as that of said
photoelectric converting section.

27. A system having a photoelectric converter
comprising:
10 a plurality of photoelectric converting sections
formed on a substrate, each of the photoelectric
converting sections including a first electrode layer
and a second electrode layer, an insulating layer
formed between the first and second electrode layers
15 for inhibiting a first type of carriers and a second
type of carriers not identical with the first type of
carriers from passing through the layer, a
semiconductor layer, and an injection blocking layer
for inhibiting said first type of carriers from being
20 injected into the semiconductor layer; and
a signal processing means for processing signals
output from the photoelectric converting sections.

28. A system according to claim 27, further
25 comprising a record means for recording signals output
from said signal processing means.

29. A system according to claim 27, further comprising a display means for displaying signals output from said signal processing means.

5 30. A system according to claim 27, further comprising a transmission means for transmitting signals output from said signal processing means.

 31. A system according to claim 27, wherein said
10 photoelectric converter has a phosphor.

 32. A system according to claim 27, further comprising a light source for emitting light to generate optical information input to said
15 photoelectric converter.

 33. A system according to claim 32, wherein said light source emits X-rays.

20 34. A method of driving a photoelectric converting section formed on a substrate, the photoelectric converting section including a first electrode layer; an insulating layer for inhibiting both types of carriers, a first type of carriers and a
25 second type of carriers whose positive or negative characteristics are opposite to those of the first type of carriers, from passing through the layer; a

semiconductor layer; and an injection blocking layer for inhibiting one type of said carriers from being injected into the semiconductor layer,

5 the driving method having a refresh mode and a photoelectric conversion mode, wherein an electric field is applied so that one type of said carriers are remained in said semiconductor layer and the other type of said carriers are introduced to said second electrode layer in the refresh mode, and

10 said carriers stored in said semiconductor layer are detected in the photoelectric conversion mode.

35. A method according to claim 34, further comprising a capacitive storing element wherein
15 integral values depending upon said carriers are stored and read out.

36. A method according to claim 34, further comprising a plurality of said photoelectric converting
20 sections wherein the plurality of said photoelectric converting sections are electrically connected in each block and, when one of blocks is in the photoelectric conversion mode, at least one of the other blocks is turned to the refresh mode.

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37. A method according to claim 34, wherein an electric field is applied to said photoelectric

converting elements in said refresh mode in accordance
with a condition represented by $(V_{rg} \cdot q < V_d \cdot q - V_{FB} \cdot q)$,
where the product $(V_{rg} \cdot q)$ of a voltage (V_{rg}) of said
first electrode layer in said photoelectric converting
5 section and an electric charge (q) of said first type
of carriers becomes smaller than the product
 $(V_d \cdot q - V_{FB} \cdot q)$ of a voltage $(V_d - V_{FB})$, the voltage
subtracting a threshold voltage (V_{FB}) from a voltage
 (V_d) of said second electrode layer, and the electric
10 charge (q) of said first type of carriers.

38. A method according to claim 35, wherein said
capacitive element has two electrode layers, an
insulating layer held between the electrode layers and
15 a semiconductor layer to be operated in the
accumulation state.